

Malaria



Section 1:

ABOUT THE DISEASE

A. Etiologic Agent

There are four *Plasmodium* species (sporozoan parasites) that commonly cause malaria in humans. They are *P. vivax*, *P. malariae*, *P. ovale*, and *P. falciparum*.

B. Clinical Description

The classic symptoms of malaria are high fever with chills, sweats, and headache, which may be paroxysmal (involving recurrence or intensification of symptoms). Febrile paroxysms generally occur in a cyclic pattern. Depending on the infecting species, fever may appear every other or every third day. Other symptoms may include malaise, nausea, vomiting, diarrhea, cough, arthralgia (joint aches), respiratory distress, and abdominal and back pain. Pallor and jaundice may also be present. Enlargement of the liver and spleen (hepatosplenomegaly) may occur and is more prominent in chronic infections. Infection with *P. falciparum* is potentially fatal and most commonly manifests as a febrile illness without specific or localizing signs. Falciparum malaria may present with coagulation defects, shock, renal and liver failure, acute encephalopathy, pulmonary and cerebral edema, and coma. The case-fatality rate is 10–40% in the absence of prompt treatment. The duration of an untreated primary attack can vary from a week to a month or longer. Relapses of *P. vivax* and *P. ovale* infections can occur at irregular intervals for up to five years. Malaria infections may persist for life (chronic infections), with or without recurrent episodes of fever.

C. Vectors and Reservoirs

Humans are the only important reservoir of human malaria. Non-human primates are naturally infected by many malarial species that can potentially infect humans, but natural transmission from non-human primates to humans is extremely rare and seldom results in serious disease. The vector for human malaria is the *Anopheles* mosquito, which transmits the parasite from infected human to uninfected human.

D. Modes of Transmission

Malaria is transmitted by the bite of an infective female *Anopheles* mosquito. Rarely, transmission can be congenital (via the placenta) or can occur through transfusions or the use of contaminated needles.

E. Incubation Period

The incubation period is approximately 7–14 days for *P. falciparum*; 8–14 days for *P. vivax* and *P. ovale*; and 7–30 days for *P. malariae*. With some strains of *P. vivax*, mostly from temperate areas, there may be a prolonged incubation period of 8–10 months until clinical illness; incubation periods for *P. ovale* may be even longer. With infections acquired by blood transfusion, the incubation period depends on the number of parasites infused; it is usually short but may be up to two months.

F. Period of Communicability or Infectious Period

Malaria is not directly communicable from person to person, except through congenital transmission; however, during parasitemia, the disease may be transmitted to other persons through blood transfusion or through shared, contaminated needles. Infected human hosts can be a source of infection for *Anopheles* mosquitoes for prolonged periods of time (1–3 years or longer, depending on the species of malaria) if not adequately treated.

G. Epidemiology

Malaria is endemic throughout the tropical areas of the world. About half of the world's population lives in areas where transmission occurs. Areas with the highest prevalence include sub-Saharan Africa, parts of Central and South America, India, and parts of Oceania and Southeast Asia. Transmission is also possible in more temperate climates, such as in the U.S., if *Anopheles* mosquitoes are present. Locally-acquired cases of malaria have been reported recently in Florida, New York, and Virginia. Mosquitoes in airplanes flying from tropical climates have been the source of occasional cases in persons working or living near international airports. However, nearly all of the malaria cases reported annually in the U.S. (~1000) are acquired abroad. *P. vivax* and *P. falciparum* are the most common species worldwide. The worldwide spread of strains of chloroquine-resistant *P. falciparum* and *P. vivax* is of increasing importance. Resistance to other antimalarial drugs is now occurring in many areas where the drugs are widely used.

H. Bioterrorist Potential

This pathogen is not considered to be of risk for use in bioterrorism.



Section 2:

REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report a laboratory-confirmed case in any person diagnosed in the U.S., regardless of whether the person experienced previous episodes of malaria while outside the country. A laboratory-confirmed case is a case with demonstration of malaria parasites in blood on microscopic examination.

Note: See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

Malaria testing is performed either at private laboratories or at the Centers for Disease Control and Prevention (CDC). The MDPH State Laboratory Institute (SLI) does not perform diagnostic testing for malaria, but it will forward thick and thin blood smears to the CDC for testing. The CDC will also perform serologic testing for malaria, but only under special circumstances (e.g., serum of a blood donor suspected of being a source of transfusion-related malaria or serum from laboratories conducting malaria-related studies).

Call the SLI Reference Laboratory, at (617) 983-6607, before submitting any specimens. Please obtain prior approval for serologic testing from the CDC Division of Parasitic Diseases, at (770) 488-7760, before contacting and submitting specimens to the SLI Reference Laboratory.



Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION**A. Purpose of Surveillance and Reporting**

- ◆ To identify imported cases of malaria.
- ◆ To ensure that cases are appropriately contained and treated to prevent the re-introduction of malarial parasites into native mosquito populations.
- ◆ To identify locally acquired cases, if they occur, and to implement appropriate active surveillance and mosquito control interventions.
- ◆ To provide travelers with appropriate preventive health information.

B. Laboratory and Health Care Provider Reporting Requirements

Malaria is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of malaria, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *Plasmodium* infection shall report such evidence of infection directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Reporting and Follow-up Responsibilities*Reporting Requirements*

MDPH regulations (*105 CMR 300.000*) stipulate that malaria is reportable to the LBOH and that each LBOH must report any confirmed case of malaria or suspect case of malaria, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using a MDPH *Malaria Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Case Investigation

1. It is the responsibility of the LBOH to complete a MDPH *Malaria Case Report Form* (found at the end of this chapter) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the health care provider or from the medical record.
2. Use the following guidelines to assist in completing the form:
 - a. Accurately record the demographic information, date of symptom onset, pregnancy status, health care provider information, and whether hospitalized (including location and associated dates).
 - b. Accurately record laboratory results, particularly the species of malaria, and the laboratory that performed the testing.
 - c. Record information about whether and where the case has spent time out of the country in the past four years, including the duration of stay and the date returned.
 - d. Indicate whether the case took malaria prophylaxis, and if so, what kind.

- e. Record whether the case has had a history of malaria within the past 12 months.
 - f. Record whether the case has either donated or received blood or organs in the past 12 months. *Note: If the patient is a recent blood or organ donor, this information should be provided to the MDPH as soon as possible so the CDC and other appropriate agencies can be notified.*
 - g. Be sure to record all clinical complications and whether the illness was fatal.
 - h. Indicate which therapy was given for this illness.
 - i. There is a "Continuation" section on the back of the form which can be used to document other relevant aspects of the investigation that are not captured elsewhere on the form (e.g., other risk information such as recent history of injection drug use or perinatal transmission, history of malaria prior to the last 12 months, and any medical care received abroad.)
3. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.
 4. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

5. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.



Section 4:

CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (150 CMR 300.200)

Minimum Period of Isolation of Patient

No restrictions, except for exclusion from blood donation.

Minimum Period of Quarantine of Contacts

No restrictions.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Locally Acquired Case

A locally acquired case of malaria is possible but would be unusual (malaria vectors are present in Massachusetts but at low density). If you determine during the course of an investigation that a case does not have a recent travel history to an endemic country, measures such as investigating local areas visited by the case to locate the focus of infection and surveillance of other people for illness may be necessary. Contact the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization, at (617) 983-6800 or (888) 658-2850, for additional assistance.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of reported cases of malaria in your city/town is higher than usual or if you suspect an outbreak, investigate to determine the source of infection and the mode of transmission. Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

D. Preventive Measures

International Travel

People traveling to malaria-endemic parts of the world should be notified of their risk of contracting the disease and of control measures they can take to protect themselves from mosquitoes. Travelers can use repellents, wear protective clothing, and use mosquito nets when rooms are not screened. They have a choice of medications recommended for prophylaxis depending on circumstances.

Detailed recommendations for preventing malaria are available 24 hours a day from the CDC Malaria Hotline, which can be accessed by telephone at (770) 488-7788, by fax at (888) CDC-FAXX or (888) 232-3299, or on the CDC website at www.cdc.gov/travel.

Travelers and recent immigrants from malaria-endemic regions with symptoms suggestive of malaria should be referred to a health care provider for prompt testing and treatment. Failure to treat individuals with malaria could lead to transmission of the disease to mosquitoes that bite these individuals and then to other people bitten by those mosquitoes.



ADDITIONAL INFORMATION

The formal CDC surveillance case definition for malaria is the same as the criteria outlined in Section 2A. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting a case to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.



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- “Regional Malaria Information.” Centers for Disease Control and Prevention. July 12, 2005.
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FORMS & WORKSHEETS

Malaria

Malaria



LBOH Action Steps

This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to malaria case investigation activities.

LBOH staff should follow these steps when malaria is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation and follow-up, refer to the preceding chapter.

- ☐ Notify the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 to report any suspect or confirmed case(s) of malaria.
- ☐ Assist MDPH with obtaining clinical specimens needed for laboratory confirmation, if necessary.
- ☐ Determine whether or not the case was acquired locally, and if so, conduct enhanced surveillance for human illness, and investigate local risk factors for viral transmission.
- ☐ If locally-acquired, institute mosquito control measures.
- ☐ Fill out a MDPH *Malaria Case Report Form* (attach laboratory results). Be sure to obtain an accurate travel history.
- ☐ Send the completed case report form (with laboratory reports) to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).